MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

GENERAL MANAGER
MATTHEW SHIELDS

Lot 82 South West Rocks

Noise Impact Assessment

SYDNEY
A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au
ABN: 11 068 954 343

DOCUMENT CONTROL REGISTER

Project Number	20110877.1
Project Name	Lot 82 South West Rocks
Document Title	Noise Impact Assessment
Document Reference	20110877.1/1609A/R0/BW
Issue Type	Email
Attention To	Hopkins Consulting Geraldine Haigh

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	16/09/2011	20110877.1/1609A/R0/BW	BW		BW

TABLE OF CONTENTS

1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with the proposed Lot 82, South West Rocks residential rezoning.

In this report we will:

- Identify environmental noise sources (primarily traffic noise) which may impact on the site and recommend acoustic treatments to reduce these impacts to acceptable levels.
- Identify potential for blasting over pressure impacts from the quarry within the vicinity of the site and recommend treatments to ensure compliance with the relevant standards as required.
- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements to ensure that nearby developments are not adversely impacted.

2 SITE DESCRIPTION / PROPOSED DEVELOPMENT

The proposed residential rezoning is located within the South West Rocks areas and is identified as Lot 82. The land is proposed to be used for future residential developments.

Potential noise impacts on the site include the following:

1. Potential impacts of traffic noise from the surrounding roadways.
2. Noise and blast over pressure impacts from the quarry within the vicinity of the site.

Refer to Figure 1 below, which is a topographical map of the proposed Lot 82 land and surrounding area proposed for residential rezoning.

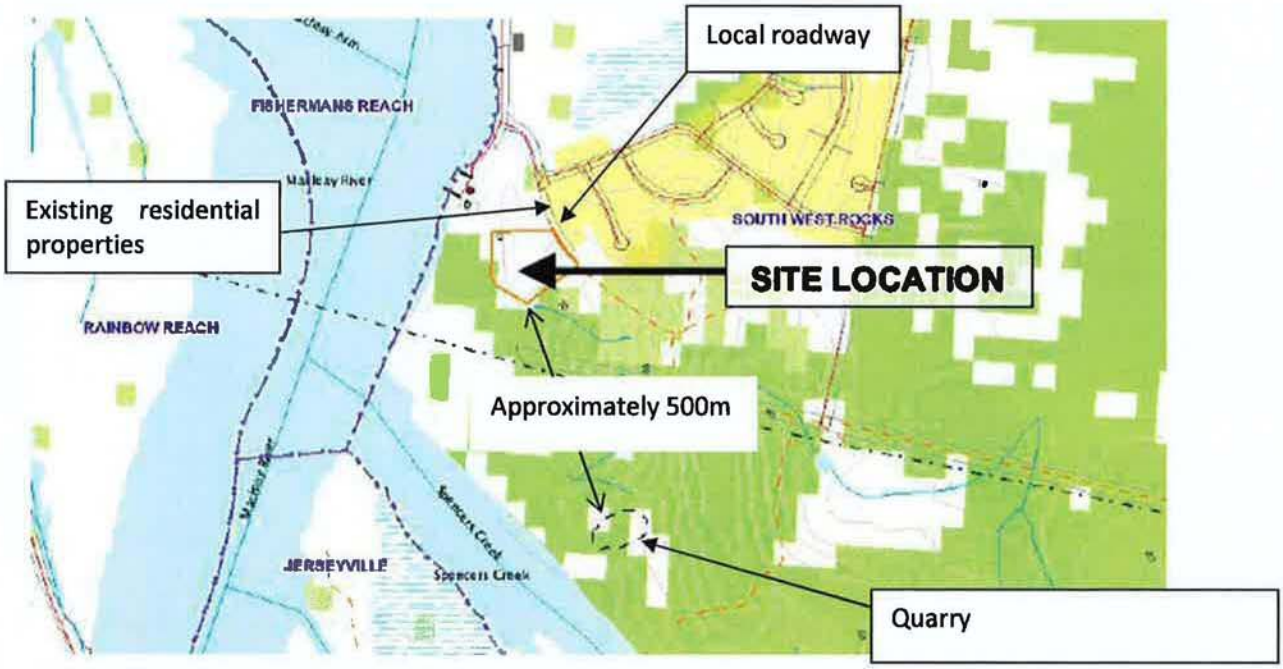

Figure 1 – Proposed Lot 82 and surrounding areas

3 TRAFFIC NOISE ASSESSMENT

3.1 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement interval.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

3.2 NOISE IMPACT ASSESSMENT

Traffic noise sources in the vicinity of the site are as follows:

- Local street to the north east of the site which will carry low volumes of traffic.

Noise impacts should comply with the requirements of the Australian Standard AS2107:2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors" recommends maximum design sound levels for different areas of occupancy in the residential development while AS 3671 -1989 "Road Traffic Noise Intrusion - Building Siting and Construction".

3.3 ACOUSTIC OBJECTIVES

The determination of an acceptable level of traffic noise for the proposed Lot 82 land requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities

As sleep is the activity most affected by traffic noise, bedrooms are the most sensitive rooms. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to television, etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries, etc can be higher.

Traffic noise will be assessed to the following criteria:

- Australian Standards AS2107-2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors".
- The NSW Road Noise Policy 2011.
- As the project is not located next to a road way which carries over 40,000 vehicles the SEPP Infrastructure 2007 (as cited in the Department of Planning Development near Rail Corridors and Busy Roads Interim Guidelines). This documentation states that an assessment is only required for developments adjacent to roadways which carry over 40,000 vehicles annually which is not the case for Lot 82 and there assessment with the SEPP criteria is not required.

3.3.1 Australian Standards Criteria

The Australian Standards recommend maximum design sound levels for different areas of occupancy in the residential development. Based on AS2107-2000 the following assessment criteria would apply to the proposed development based on developments near minor roads.

Table 1 - AS2107:2000 Internal Traffic Noise Criteria

Space/Activity Type	Internal Noise Level Criteria
Living Areas	40 dB(A) Leq (24 hour)
Bedrooms	35 dB(A) Leq (9 hour, 10pm to 7am)

3.3.2 NSW Road Noise Policy 2011

The NSW Road Noise Policy 2011 sets out external noise level criteria for existing residence affected by additional traffic on existing local roads generated by land use developments.

The NSW Road Noise Policy 2011 criteria for traffic noise is displayed below. The relevant section for the proposed Lot 82 rezoning is point 6 in the table below.

Local roads	4. Existing residences affected by noise from new local road corridors 5. Existing residences affected by noise from redevelopment of existing local roads 6. Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,(1\ hour)}$ 55 (external)	$L_{Aeq,(1\ hour)}$ 50 (external)

3.4 RESULTING CRITERIA

This assessment shall be conducted in accordance with the criteria set out above from AS2107:2000 and the NSW Road Noise Policy 2011. The summarised noise criteria is detailed in the tables below.

Table 2 – Project Noise Level Criteria for Suite

Noise Type	Space/Activity Type	Internal Noise Level Criteria
Internal Noise Level	Living Areas	40 dB(A) Leq (24 hour)
	Bedrooms	35 dB(A) Leq (9 hour, 10pm to 7am)
External Additional Traffic Noise Generation	Existing Residence – Day Time	55 dB(A) Leq (1 hour)
	Existing Residence – Night Time	50 dB(A) Leq (1 hour)

3.5 RECOMMENDATIONS

Internal traffic noise intrusion into the proposed future residential properties as a result of existing traffic noise has been investigated in this report. The assessment has been conducted based on traffic noise levels generated from traffic noise on the local roadway of up to 55 dB(A) Leq as detailed by the NSW Road Noise Policy 2011. This noise level is an expected maximum for the type of roadway located within the proximity of the proposed Lot 82 rezoning.

Future internal noise levels within the residential properties located on Lot 82 proposed for rezoning will comply with the internal noise level criteria of the Australian Standard AS2107:2000 with standard building constructions (such as 4mm float glazing and light weight external walls).

No acoustic treatments over and above standard constructions will be required to ensure internal noise levels are achieved for roof/ceiling, external wall, floors and windows.

Based on this assessment internal noise levels within any future residential property located on Lot 82 which is proposed for rezoning is both possible and practical and as such the proposed lands are suitable to be zoned for residential use.

3.6 ADDITIONAL TRAFFIC VOLUMES

This section of the report instigates the potential for additional traffic volumes on existing residential properties.

The potentially worst affected existing residential properties are the properties to the north of the site as identified in Figure 1 above.

Based on the potential number of cars which can be located within the Lot 82 as a result of future residential premises a maximum number of car movements in any given hour has been assessed as an additional 15 vehicles in any given hour.

Additional traffic noise on the surrounding roadways as a result of the additional traffic movements as a result of the proposed rezoning of Lot 82 will be less than 50 dB(A) Leq (1 hour) during the day or night and comply with criteria detailed above. For a significant increase in noise from traffic associated with the site volumes would need to increased flows on surrounding streets by more than 40%. Based on existing traffic volumes on surrounding streets an increase of this amount will not occur.

Based on this assessment noise associated with additional traffic volumes will comply with the NSW Road Noise Policy 2011 and as such the proposed lands are suitable to be zoned for residential use.

4 EXTERNAL NOISE EMISSION ASSESSMENT

Noise emissions from the site should be assessed to ensure that the amenity of nearby land users is not adversely affected.

The nearest potentially affected noise receivers are:

- Existing residences located to the north of the site;
- Future residences to be located within Lot 82.

Noise emissions noise will be assessed to the following criteria:

- The DECCW Industrial Noise Policy

4.1 BACKGROUND NOISE

Based on the Australian Standard AS1055.3-1997 Acoustics - Description and Measurement of Environmental Noise provides background noise levels for land categories. The suitable background noise levels for the proposed Lot 82 site based on R1 – Areas with negligible transportation are detailed in the table below and will be used in the assessment of noise impact to surrounding receivers.

Table 3 - Measured Background Noise Levels

Location	Description	Day Noise Level 7am to 6pm (dB(A))	Evening Noise Level 6pm to 10pm (dB(A))	Night Noise Level 10pm to 7am (dB(A))
Lot 82 R1 – Areas with negligible transportation	Rating Background Noise Level $L_{90,15min}$	40	35	30

4.2 NOISE EMISSION GUIDELINES AND ASSESSMENT CRITERIA

Noise emissions from the site should comply with all of the acoustic criteria outlined below.

4.2.1 INDUSTRIAL NOISE POLICY OBJECTIVES/GUIDELINES

The DECCW Industrial Noise Policy provides guidelines for the assessment of noise impacts from industrial and commercial premises. The recommended assessment objectives vary depending on the nearest potentially affected residential receivers, the time of day and the type of noise source. The DECCW Industrial Noise Policy has two requirements that must both be satisfied; that is, an intrusiveness criterion and an amenity criterion.

Criterion for neighbouring commercial/retail/recreation properties are based on set noise level criterion within the Industrial Noise Policy.

If a noise source achieves compliance with the INP guidelines it would generally be accepted the noise source would not cause "offensive noise" as defined in the Protection of the Environment Operations Act (refer below).

4.2.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions, and requires that noise emissions measured using the L_{eq} descriptor not exceed the existing background noise level by more than 5 dB(A) Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

The resulting intrusiveness criteria are presented in the table below.

Table 4 –DECCW Intrusiveness Noise Emission Objectives

Location	Description	Noise Emission Goal - dB(A)$L_{eq(15min)}$		
		Day	Evening	Night
Nearest residential receiver	Rating Background Noise Level $L_{90,15min}$	45	40	35

4.2.1.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The DECCW Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 titled *"Amenity Criteria"* on page 16 of the Policy designates four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. The DECCW Industrial Noise Policy also includes recommended noise levels for other land uses such as commercial and industrial premises. The nearest potentially affected residential premises situated immediately to the south of the proposed development site which have been classified as being situated in an sub-urban noise amenity area as defined by the DECCW NSW Industrial Noise Policy.

The following table presents the amenity criteria applicable to the nominated nearest potentially affected receivers. The receiver type utilised against the indicative noise amenity area is defined by the Rural criteria.

Table 5 - DECCW Amenity Noise Levels for Nearest Potentially Affected Residential Receivers

Time of Day	Recommended Acceptable Noise Level dB(A) L_{Aeq} (period)
Day (7.00am to 6.00pm)	55
Evening (6.00pm to 10.00pm)	50
Night (10.00pm to 7.00am)	45

The noise emission limit criteria for this project have been determined using the DECCW Industrial Noise Policy and the unattended noise monitoring data.

4.2.2 Assessment Criteria Summary

Table 6 presents a summary of the prevailing assessment criteria applicable to the proposed development at the nearest potentially affected residential receivers.

Table 6– External Noise Emission Objectives

Location	Day Time Noise Objective dB(A) L_{eq}	Evening Time Noise Objective dB(A) L_{eq}	Night Time Noise Objective dB(A) L_{eq}	Night Time Noise Objective dB(A) L_1
Residential Receivers	45	40	35	50 dB(A) L1

4.3 RECOMMENDATIONS

Mechanical plant items will be treated to ensure noise level criteria detailed in the table above are achieved. Based on experience with similar residential projects compliance with the required criteria will be both possible and practical with minimum or no acoustic treatments.

Based on this assessment noise level criteria for noise generated on the site have been set and compliance will be achievable without significant acoustic treatments. As such the proposed Lot 82 site is suitable for rezoning as residential use.

5 QUARRY ACTIVITIES

This section of the report details the assessment of noise and blast over pressure as a result of the use of the quarry approximately 500m to the south of the site.

The quarry is curtly used intermittently, including patch blasting to produce rock for repair to Macleay River training walls. It is our understanding the quarry has not been used for production of materials on a significant scale of a number of years and there a no plans to activate the quarry in the future for commercial activities. The quarry is not a commercial quarry and is owned by PWD/Crown and is for the public purposes only. The quarry may be used for intermittent use for maintenance purposes.

The quarry is located approximately 500m from Lot 82 and there area at least two geographical ridges between the quarry and the site.

Based on the AS 2187.2-2006 Explosives - Storage and use - Use of explosives the following criteria for buildings associated with blasting is recommended.

The comments raised on concluded in the previous report conducted by ERM remain accurate under current legislation requirements.

5.1 GROUND BORN VIBRATIONS

The recommended criteria within AS 2187.2-2006 for ground born vibration are detailed in the figure below.

TABLE J4.4.2.1

TRANSIENT VIBRATION GUIDE VALUES FOR COSMETIC DAMAGE (BS 7385-2)

Line	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTES:

1 Values referred to are at the base of the building.

2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

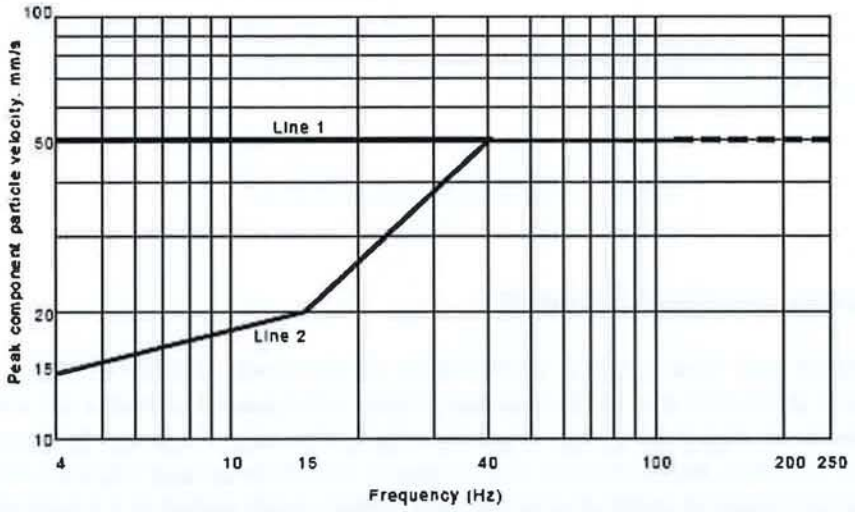

FIGURE J4.4.2.1 TRANSIENT VIBRATION GUIDE VALUES FOR COSMETIC DAMAGE (BS 7385-2)

Figure 1- Ground Born Vibration Criteria from Blasting

5.2 BLAST OVER PRESSURE

The recommended blast over pressure criteria within AS 2187.2-2006 are detailed in the figure below.

AIRBLAST LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J5.4(B))

Category	Type of blasting operations	Peak sound pressure level (dBL)
Human comfort limits		
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	115 dBL for 95% blasts per year. 120 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	120 dBL mm/s for 95% blasts. 125 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	125 dBL maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

* A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

Figure 2- Blast Over Pressure Criteria

5.3 ANZECC BLASTING REQUIREMENTS

The Australian and New Zealand Environment Conservation Council (ANZECC) guidelines to minimise the annoyance due to blasting overpressure and ground vibration are another example of vibration limits based on human response criteria. For blasts between 9:00 am and 5:00 pm Monday to Saturday, the guidelines recommend a maximum ground vibration level of 5 mm/s (which may be exceeded on 5% of occasions in a twelve month period to a maximum of 10 mm/s). The frequency component is not considered.

The ANZECC ground vibration limit of 5 mm/s would approximate to the 12.5 mm/s ANSI day time residential limit, allowing for a 2.5 times structural magnification, which is within the range of magnifications expected on the floor of a building.

Based on the location of Lot 82 to the exiting Quary compliance with the ANZECC requirements will be achieved without any acoustic treatments.

5.4 DISCUSSION

AS part of this assessment on investigation into the potential impact from the quarry impacting the proposed Lot 82 in the event it is rezoned to residential has been conducted in this report. As the quarry is not currently active noise blast over pressure and ground vibration measurements could not be conducted at the site. Not withstanding this ERM has previously conducted measurements at the site. ERM measured impacts indicate that potential impacts from activities within the quarry will comply with the criteria detailed in the Figures above.

In addition to the previous assessment conduct by ERM this office has conducted an investigation into the potential for blast overpressure and ground vibration impacts based on measurements conducted on previous projects. Based on our experience with similar sites the location of he quarry which is approximately 500m from Lot 82 and the fact that there are 2 geographical ridges between the quarry and the site compliance with the recommended blast over pressure and ground born vibrations will be achieved in the event the quarry used for blasting (which is unlikely).

Based on this investigation the proposed Lot 82 site is suitable for rezoning as residential use and will not be negatively impacted from the potential use of the quarry located approximately 500m to the south of the site.

6 CONCLUSION

This report presents our assessment of potential noise impacts on the proposed rezoning of Lot 82 South West Rocks. The assessment has investigated a number of potential acoustic impacts including treaffic noise, noise generated on the site and the impact of blast over pressure and ground vibration from the quarry located to the south of the site.

Based on our assessment all potential acoustic impacts will be suitable for residential properties to be located on the site and Lot 82 can be rezoned fro residential use.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

B.G.White.

Acoustic Logic Consultancy Pty Ltd
Ben White